INSTRUCTIONS

FOR

Weston Model 981

PROPORTIONAL MUTUAL CONDUCTANCE TUBE-TESTER

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Newark 5, New Jersey, U. S. A.

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INSTRUCTIONS

FOR

WESTON

MODEL 981

Proportional Mutual

Conductance Tube-Tester

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DESCRIPTION

GENERAL: The Model 981 Tubetester consists of a vacuum tube and voltage regulator tester mounted as one complete assembly in a welded aluminum case which is equipped with a hinged cover storage compartment with two sections; one for the line cord and the other for spare parts and accessories. The over all size is 17 3/4" X 11 15/32" X 6 1/8".

POWER REQUIREMENTS: 115 volts, 60 cycles single phase alternating current, 30 watts.

CONTROLS: Near the upper left hand corner of the panel is the filament voltage switch marked "Filament Volts". It is important that this switch be set correctly to avoid filament burnouts.

On the opposite side of the meter is located the "Leakage Test" switch which disconnects the tube electrodes from the tube testing circuit and connects them into the short test circuit.

The "Plate Voltage" switch selects specific potentials to be applied to the tube elements. This control should always be in the "A" position unless specified otherwise.

Just below the "Plate Voltage" is the "G_m Multiplier" which extends the basic 3000 G_m scale by factors of 1, 2, 4 or 8 to full-scale deflections of 3000, 6000, 12,000 or 24,000 Micromhos.

The "Line Control" is used for adjusting the transformer potentials to the correct values. By pulling down the "Line Check" switch the instrument pointer can be adjusted over the red arrow marked line check by means of the "Line Control".

Adjusting the "Meter Sensitivity" control varies the sensitivity of the meter circuit.

The "Grid Bias" control is used to adjust the bias to the proper value on all amplifier tubes.

METER: The 0-3000 micromhos is the basic G_m scale being multiplied by the factors of 1, 2, 4 or 8 when necessary. Just below this is the voltage regulator scale, reading from 0-200 volts d-c. There is also a resistance scale which indicates up to 10 megohms and is accurate to ± 10%. Scale marks are also provided for indicating the condition of diodes and rectifiers.

ACCESSORIES: One Black Top Connector Grid Lead for tube testing and one Red Top Connector Plate Lead for tube testing.

THEORY OF OPERATION: Of the many measurable characteristics of vacuum tubes, the mutual conductance is the one most closely associated with operating performance. The 981 Tubetester indicates mutual conductance by measuring the 5 kilocycle alternating current produced in the plate circuit by a 5 kilocycle signal applied to the tube under test. Since all electrode potentials are applied to the tube under test at a frequency of 60 cycles, the 5 kilocycle signal must be separated from the 60 cycle component of plate current. This is accomplished by means of a high pass filter so that only the 5 kilocycle signal is present in the measuring circuit.

ADDITIONAL TESTS: The testing of diodes is accomplished as an emission check since diodes have no grid. The factor which determines the end of useful life of these tubes is cathode emission under specific conditions. Voltage regulator and thyratron tubes can also be checked through the use of an internal d-c power supply which is switched into the VR circuit when the "Plate Voltage" switch is indexed to the "F" position. The meter then becomes a 0-200 volts d-c voltmeter which indicates the firing and regulating potential of the VR tube being tested.

OPERATION

DATA CHARTS: A complete list of data for testing tubes on the Model 981 Tube-

tester is included as a separate booklet. The headings for the nine columns are:

TYPE - Lists the tube according to the RMA number.

FIL - Position of the FILAMENT VOLTS switch.

MULT - Position of the G_m MULTIPLIER switch.

BIAS - Setting of the GRID BIAS control.

SEL - Positions of each of the nine SELECTOR switches.

SENS - Setting of the METER SENSITIVITY.

Ep - Position of the ANODE VOLTAGE switch.

REJ.PT. - Value of the meter reading at which tube being tested should be rejected.

REMARKS - Any pertinent information as to testing of the tube which may include any of the following abbreviations:

F - Meter will indicate short when LEAKAGE TEST switch is in position 1.

No leak check - Do not rotate LEAKAGE TEST switch through positions 1, 2, 3, 4 or 5.

Pe - Pentode section of tube is being checked.

Tr - Triode section of tube is being checked.

P_1 & P_2 - Tubes shall be tested with toggle switch marked P_1-P_2 in both P_1 and P_2 positions.

This same procedure must be followed for remarks where both positions of the K and G toggle switches are called for. Unless stated otherwise these toggles must be in the K_1, P_1 and G_1 positions.

Firing lim - Tube must fire for given limits of voltage.

Osc. - Oscillator.

Thyra - Thyratron.

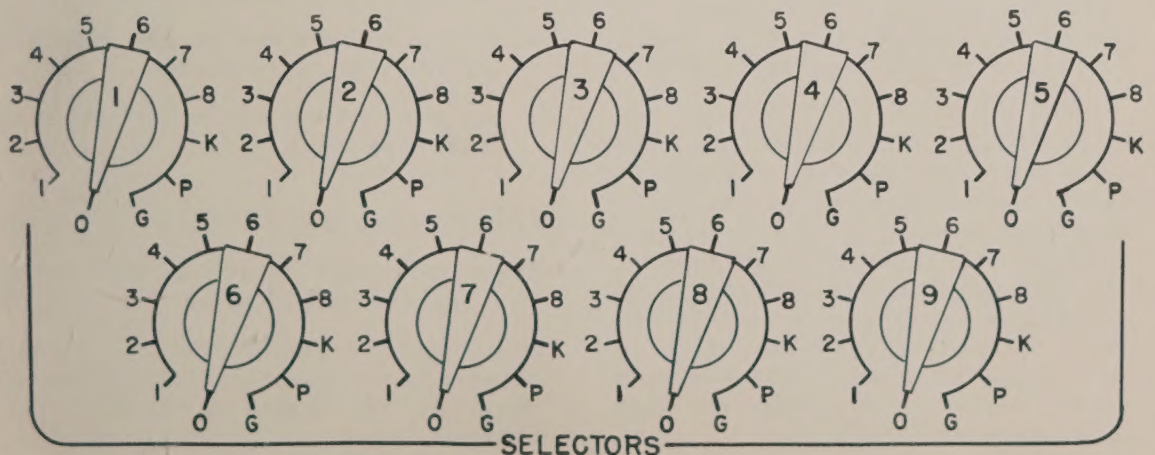
The selectors are read from left to right for both the top row of 5 and the bottom row of 4 as shown at the bottom of the page.

CAUTION

It is important that these selectors be correctly set to prevent damage to the tube.

PROCEDURE FOR TESTING TUBES FOR G_m:

1. Refer to data for tube being tested.



2. Turn FIL, MULT, BIAS, SEL, SENS and Ep to proper settings and insert tube in proper socket.

3. Set LEAKAGE TEST switch to position 1.

4. Turn tubetester on and allow tube to warm up.

5. Pull down LINE CHECK switch and adjust meter pointer to red arrow by means of the LINE CONTROL.

6. Rotate LEAKAGE TEST switch through positions 1, 2, 3, 4 and 5, tapping tube lightly for each position of the switch. If meter indicates while making the leakage test, leakage or a short is present in the tube. (A leakage indication may be normal if listed in the REMARKS column). A meter indication on position 1 indicates heater to cathode leakage. Readings on position 2, 3, 4, 5 indicate suppressor grid, plate, screen grid, and control grid leakages respectively.

7. With LEAKAGE TEST switch in tube test position, depress G_m TEST switch for G_m reading. If meter indicates less than the value given in the REJ. PT. column the tube should be regarded as bad.

8. Make any additional tests as listed in the REMARKS column.

PROCEDURE FOR TESTING DIODES AND RECTIFIERS:

1. Refer to tube data for tube to be tested and follow steps 2 through 6 of Procedure for Testing Tubes for G_m.

2. With LEAKAGE TEST switch in tube test position, depress the AMPL.-RECT. & DIODES switch to the RECT. & DIODES position. To determine whether the tube is to be read on the DIODES OK or the RECTIFIERS OK scale it is necessary to look in the MULT. column of the tube data. A "D" means the tube is checked as a diode, while an "R" means the tube is checked as a rectifier.

PROCEDURE FOR TESTING VOLTAGE REGULATOR (VR) TUBES:

1. Refer to tube data for tube being tested.

2. Set FIL, SEL, AND Ep to proper settings. The VR in the MULT column indicates that the procedure for testing VR tubes is to be used.

3. Turn LINE CONTROL full counterclockwise and insert tube in socket.

4. Turn tubetester on but do not make a line check.

5. Turn LINE CONTROL slowly clockwise, observing meter at the same time.

6. Observe the point on the 200 volt test scale at which the tube fires. It is at this point that the pointer will fall back to a lower value of voltage. The voltage at which the tube fires must be within the firing limits as specified in the REMARKS column.

7. Leaving the LINE CONTROL set at this point, vary the FILAMENT VOLTS switch through the voltages stated and again observe meter reading. This new reading should not vary more than the number of volts regulation as stated in the REMARKS column.

PRECAUTIONS IN TESTING VOLTAGE REGULATOR (VR) TUBES:

1. Do not insert tube in socket until all controls used have been properly set.

2. Do not make a leakage test.

3. Do not change any of the SELECTORS while tube is in socket.

4. Do not rotate LINE CONTROL after tube has been fired.

PROCEDURE FOR TESTING TUNING EYE TUBES:

These tubes are listed as such by the "E" in the MULT column.

When testing these tubes it is only necessary to vary the BIAS CONTROL and observe if the shadow on the tuning eye changes.

MAINTENANCE

FUSES: Two standard 3AG 2 amp fuses are used in the line cord plug. To remove, push the fuse out of the plug, using a test prod or similar pointed tool.

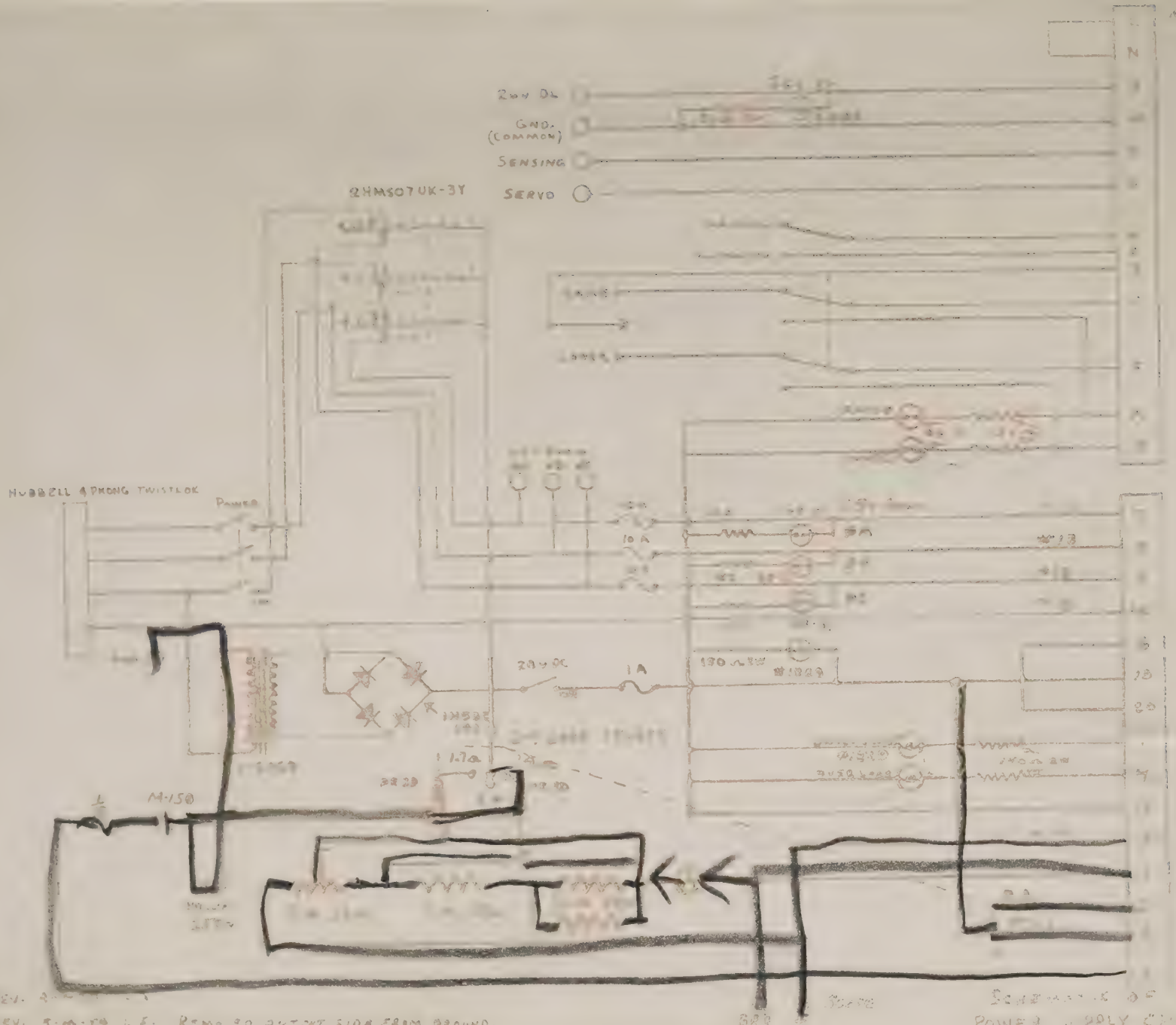
TUBES: A type 3A4 miniature tube is used in the 5 kilocycle oscillator. If there is no indication on the meter after several tubes known to be good have been tested the 3A4 should be checked. A type 6X5 is used as the rectifier in the d-c supply for testing VR tubes. If no meter reading is obtained when making VR tests the 6X5 should be checked.

LAMPS: Two #47 bayonet type pilot bulbs are used in the Pilot and Overload Lamp circuits. The Overload lamp will show a slight indication when the tester is first turned on, and will normally show a glow when a cold, heater type tube is first inserted in the tester.

REMOVING PANEL: To remove the panel from the case, unfasten the bracket screw on the bottom of the case. Then remove the 4 panel screws at the corners of the panel and lift out carefully. Be sure enough of the line cord is pushed back through the rubber grommet so that the panel can be lifted clear of the case.

NOTES

6AL5 tubes should be checked as diodes, not rectifiers

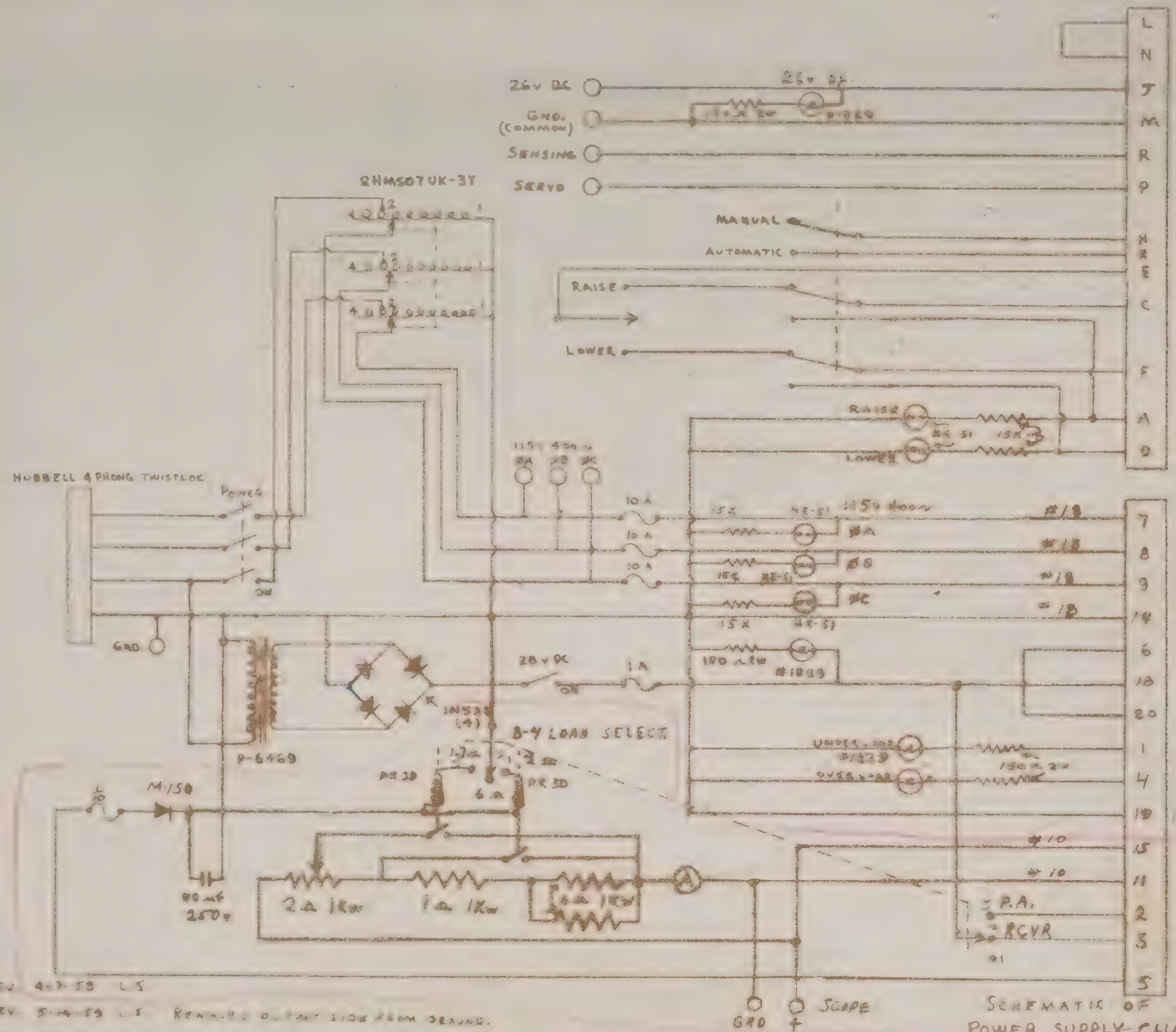


REV. A-

REV. 5-M-69 L.S. REMO 20 OUTPUT SIGS FROM GROUND.

23V.C 6-9 5-9 L.S. ADDED VARIAC AND INTERNAL 28V DC P/S - CHANGED INPUT FROM BANKS PLUG.

SCHEMATIC OF SOLENOID
POWER SUPPLY CHASSIS
SKSTE-0160

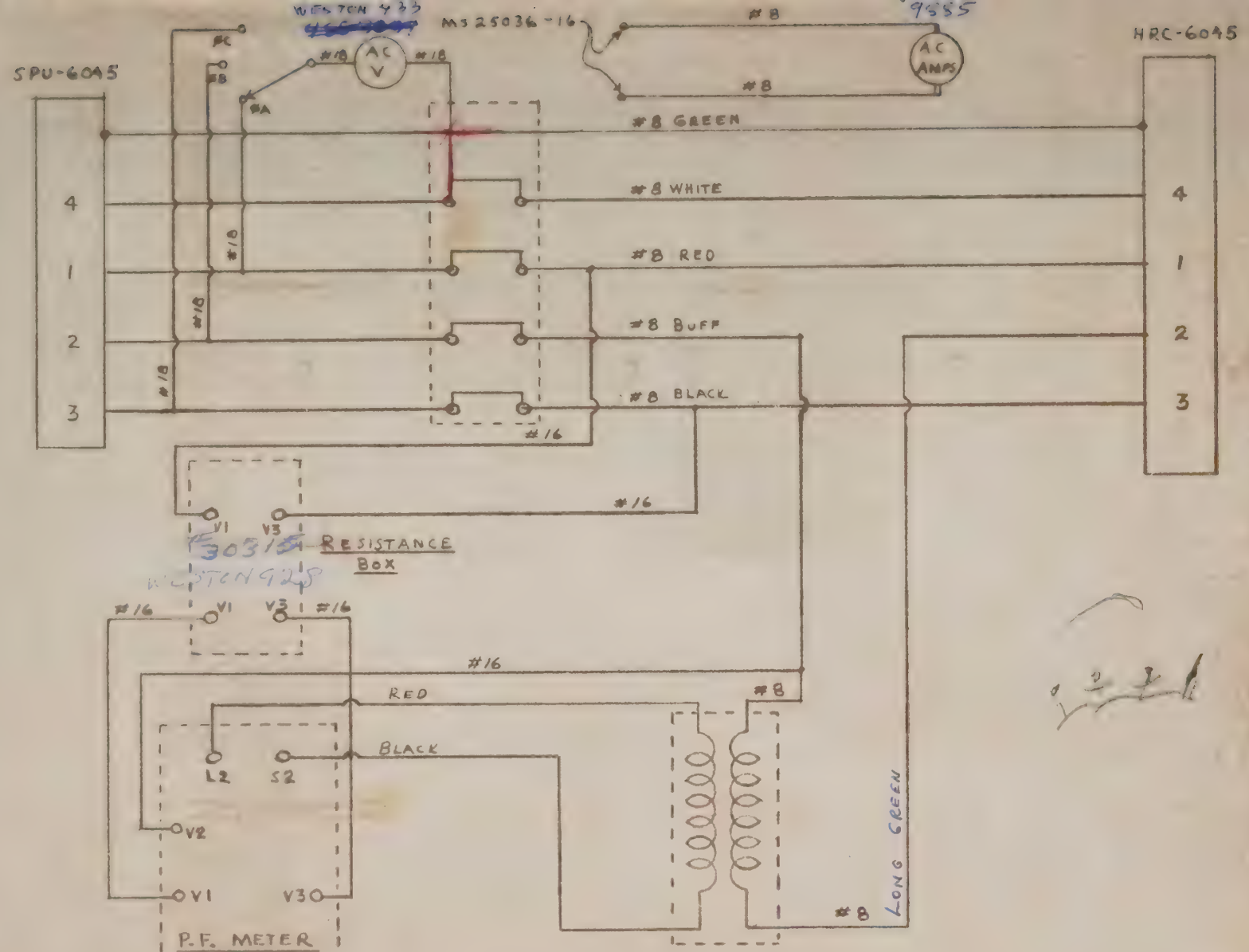


REV. 4-7-59 L.S

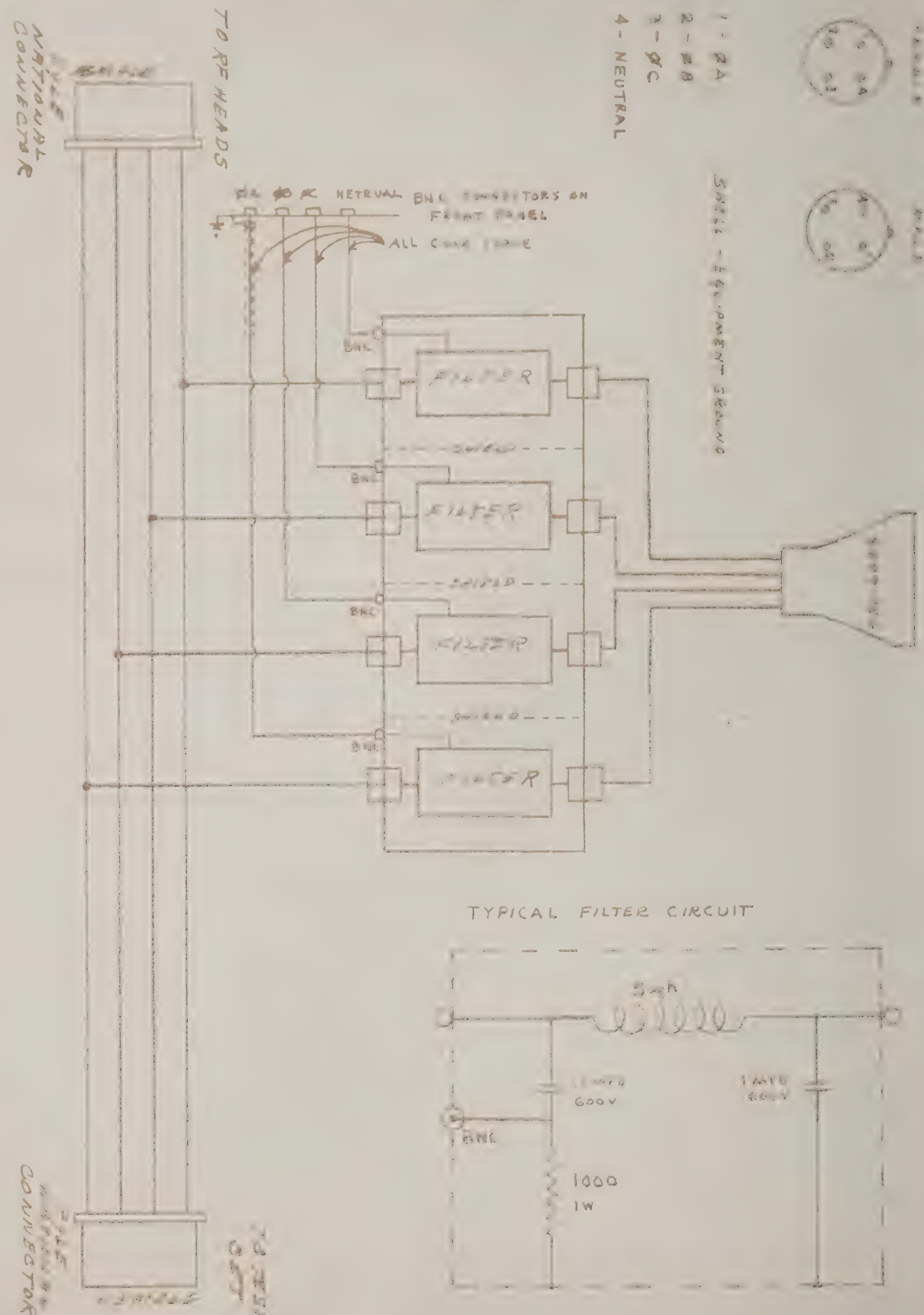
REV. 5-14-59 L.S REMOVED OUTPUT SIDE FROM GROUND.

REV. 6-9-59 L.S. ADDED 26V DC AND INTERNAL 28V DC P/S - CHANGED INPUT FROM JONES PLUG.

SCHEMATIC OF SOLENOID POWER SUPPLY-CHASSIS TEST SKSTE-0160


WESTON 433
MS 25036-16
#8
#8
AC AMPS
AC V
#18
#18
#A
#B
#C
SPU-6045
HRC-6045
4
1
2
3
#8 GREEN
#8 WHITE
#8 RED
#8 BUFF
#8 BLACK
#16
#16
#16
#16
#16
V1
V3
RESISTANCE BOX
#30315
WESTON 928
#16
V1
V3
#16
#16
RED
#8
BLACK
L2
S2
V2
V1
V30
P.F. METER
#30317
WESTON 927
#8
LONG GREEN
WESTON MODEL 604 TYPE 2
58 0043 200 : 5 RATIO
MODIFIED BY WINDING 10 TURNS
OF # 8 WIRE AROUND TOROID
SCHEMATIC OF
MEASUREMENTS
SKSTE-0167
BY
DATE
CHKD. BY
DATE
SUBJECT
SHEET NO
OF
JOB NO

CHKD. BY ___ DATE ___ SUBJECT LINE STRETCHER NETWORK SHEET No. ___ OF ___ JOB NO. ___



ERRATA SHEET

MODEL 981 TYPE 1 TUBETESTER

PROCEDURE FOR TESTING LOW POWER THYRATRONS

The Model 981 tests the cut-off and emission characteristics of low current thyratrons. Procedure for testing these tubes is as follows:

1. Adjust FIL, SEL, SENS, and EP to proper settings.
2. Insert tube in socket and rotate GRID BIAS control to 45.
3. Turn tubetester on and make line check.
4. Pull AMPL-RECT. & DIODE switch to RECT. & DIODE position.
5. Slowly rotate GRID BIAS control down to zero observing value of BIAS Setting at which meter suddenly deflects up scale. This value should fall between the limits given in the REMARKS column. For example, a tube having "FIRE 10-0 bias" in the REMARKS colum should fire for a value of bias between 10 and 0, otherwise, the tube should be rejected. To test the emission of a thyratron the meter pointer should fall in the RECTIFIERS OK portion of the scale for the tube to be considered good.

TUBE TEST DATA CHANGES

1B3

Under MULT. change R to D
Under SENS. change 46 to 45
Under EP. change D to A

6CL6

Under MULT. change to 4
Under SENS. change to 18
Under REJ. PT. change to 710

REVISED TUBE DATA
For Model 981 Type 1 Tubetester

TUBE TYPE	FILAMENT VOLTS	MULT.	BIAS	SEL.	SENS.	Ep.	REJ.PT.	REMARKS
1B3	1.1	D	--	06000-0700	45	A	--	Plate cap; F
6AG7	6.3	4	12	27151-4630	46	A	1800	
6AL5	6.3	D	--	K3761-2P00	36	B	--	P1 K1 & P2 K2
6CL6	6.3	4	9	15476-320G	18	A	710	G1 & G2
6H6	6.3	D	--	2731P-06K0	39	B	--	P1 K1 & P2 K2
6N7	6.3	1	14	2735G-P610	43	A	1040	P1 G1 & P2 G2
12AL5	13	D	--	K3761-2P00	36	B	--	P1 K1 & P2 K2
12AV6	13	1	16	51760-0300	46	E	1040	
	13	D	--	01763-P000	48	B	--	P1 & P2
12SK7	13	1	12	17251-4630	38	A	1300	
45	2.5	1	40	73500-6000	21	A	1320	F.
2050	6.3	R	--	07305-2610	26	D	--	Thyra; Fire 15-0 Bias
2051	6.3	R	--	07305-2610	26	D	--	Thyra; Fire 15-0 Bias
6BZ7	6.3	4	7	PGK76-3510	35	A	1050	$P_1 G_1 K_1 + P_2 G_2 K_2$
12AZ7	6.3	2	13	35166-PGK7	47	A	1300	" " " " " " " "

10/8/53

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